

CLAIMS

[1] (Amended) A diaphragm pump comprising:

a pressure chamber formed into a flat shape and is filled up with liquid;

5 a suction side flow passage and a discharge side flow passage disposed at both ends of the pressure chamber so that axes thereof are aligned with each other and are connected with the pressure chamber;

at least one groove formed in a peripheral wall of the pressure chamber and for accelerating a flow of the liquid downstream in a flow direction; and

10 at least one diaphragm disposed on at least one of an upper surface and a lower surface of the pressure chamber and for oscillation to make a volume of the pressure chamber variable.

[2] (Amended) The diaphragm pump according to Claim 1, wherein the groove has a part with an opening in the upper surface facing the pressure chamber, into which the liquid flows, and a side part with an opening opened to a peripheral wall surface of the pressure chamber, from which the liquid is 5 discharged downstream in the flow direction.

[3] (Amended) The diaphragm pump according to Claim 1 or 2, wherein the groove is extended in a radial direction while a point in the vicinity of an entrance of the discharge side flow passage is set as the center.

[4] (Amended) The diaphragm pump according to any one of Claims 1 to 3,

wherein the axes are positioned at the center of a cross-sectional shape of the pressure chamber in a surface orthogonal to the axes.

[5] (Amended) The diaphragm pump according to any one of Claims 1 through 4, wherein each cross-sectional shape of the pressure chamber, the suction side flow passage, and the discharge side flow passage in a surface orthogonal to the axes are formed in an approximate rectangle.

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[6] (Amended) The diaphragm pump according to Claim 5, wherein a lower surface of the pressure chamber and the lower surfaces of the suction side flow passage and the discharge side flow passage are formed on the same surface.

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[7] (Amended) The diaphragm pump according to any one of Claims 1 through 6, wherein a length of the pressure chamber viewed from an upper surface in a direction orthogonal to the axes is continuously shortened toward the suction side flow passage or the discharge side flow passage.

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[8] (Amended) The diaphragm pump according to any one of Claims 1 through 7, wherein a height of the pressure chamber is continuously lowered toward the suction side flow passage or the discharge side flow passage.

[9] (Amended) The diaphragm pump according to any one of Claims 1 through 8, further comprising:

check valves, respectively disposed on the suction side flow passage and the discharge side flow passage, at least one of the check valves being

5 tilted relative to a direction of the axes.

[10] The diaphragm pump according to any one of Claims 1 through 9, further comprising:

at least one intake opened to an upper surface of the suction side flow passage and to introduce bubbles mixed in the liquid; and

5 a sealed space connected with the intake and to collect the introduced bubbles.

[11] The diaphragm pump according to Claim 10, wherein the intake is positioned in the suction side flow passage upstream relative to the check valve.

[12] The diaphragm pump according to any one of Claims 1 through 11, wherein the diaphragm is a piezoelectric oscillator driven by a piezoelectric element.

5 [13] A cooling system comprising:

the diaphragm pump according to any one of Claims 1 through 12; and

a closed-structure flow passage for circulating liquid discharged from the discharge side flow passage in the diaphragm pump and for returning the 10 liquid to the suction side flow passage.